NOAA SCIENTIFIC PUBLICATIONS REPORT

JULY 3, 2015

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Facilitating the use of drought early warning information through interactions with agricultural stakeholders
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Journal of Great Lakes Research (1.77)

A modeling study of the effects of river runoff, tides, and surface wind-wave mixing on the eastern and western Hainan upwelling systems of the South China Sea, China
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NWS

Who does what – the roles of scientists in wildland fire weather
Fire Management Today

Red flag warnings in the 21st century
Fire Management Today

HIGHLIGHTED ARTICLES

On the frontline: tracking ocean acidification in an Alaskan shellfish hatchery
PLoS ONE (3.534)
W. Evans, **J. T. Mathis (OAR/PMEL)**, J. Ramsay, and J. Hetrick

- This study is the first to look at the vulnerability of an Alaskan shellfish hatchery to ocean acidification
- Results show a 5-month window of favorable growing conditions for shellfish each year
- The 5 month window will shrink and may ultimately close as water quality declines due to the increases in carbon dioxide levels in the ocean.

Alaska currently has one shellfish hatchery in the state, but the industry is expected to expand to more than $1 billion in the next 30 years as the demand for seafood increases. This study, a collaboration between NOAA/PMEL, the University of Alaska Fairbanks and the Alutiiq Pride Shellfish Hatchery in Seward, AK, is the first continuous (10 month) monitoring of seawater conditions at an Alaska shellfish hatchery looking at the potential vulnerability of this industry to ocean acidification. The invasion of anthropogenic carbon dioxide (CO_2) into the ocean is shifting the marine carbonate system such that saturation states of calcium carbonate ($CaCO_3$) minerals are decreasing, and this is having a detrimental impact on early life stages of select shellfish species. Currently, the Alutiiq Pride Shellfish Hatchery (APSH) in Seward, Alaska is the only hatchery in the state, and produces many shellfish species with early life stages known to be sensitive to low $CaCO_3$ saturation states. Here the researchers present the first land-based ocean acidification measurements made in an Alaskan shellfish hatchery, and detail the trends in the saturation state of aragonite (Ωarag), the more soluble form of $CaCO_3$, over a 10-month period in the APSH seawater supply. These data indicate the largest changes are on the seasonal time scale, with extended periods of sub-optimal Ωarag levels (Ωarag < 1.5) in winter and autumn associated with elevated water column respiration and short-lived runoff events, respectively. The data pinpoint a 5-month window of reprieve with favorable Ωarag conditions above the sub-optimal Ωarag threshold, which under predicted upper-bound CO_2 emissions trajectories is estimated to close by 2040. The current and expected conditions seen at APSH are essential to consider for this developing Alaskan industry.
Published online: 1 July 2015
Available online:
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130384

Evaluating the impact of improvements in the boundary layer parameterization on hurricane intensity and structure forecasts in HWRF
Monthly Weather Review (2.76)
J. A. Zhang (OAR/AOML), D. S. Nolan, **R. F. Rogers (OAR/AOML),** and **V. Tallapragada (NWS/EMC)**

- This study demonstrates the benefit of using hurricane hunter aircraft observations to significantly improve hurricane model forecasts.
- It demonstrates the value of continued aircraft observations when data are used to update and improve model code and overall model performance.
- The upgraded technique can be used to make future model forecast models even better to save lives and reduce evacuation costs.

The National Hurricane Center uses the Hurricane Weather Research and Forecasting (HWRF) model to forecast hurricane track and intensity, size, and where the strongest winds are. This paper looks at changes in the atmosphere closest to the ocean surface and its impact on forecasts. NOAA Hurricane Hunter aircraft observations are compared to the HWRF forecasts. The differences between the HWRF model and NOAA Hurricane Hunter aircraft observations have been used to upgrade the HWRF model. These upgrades led to large improvements in forecasts of hurricane track and intensity, thereby advancing the Weather Service. This technique can be used to make future versions of the model even better.
Expected Publication date: July 2015
Available online: http://journals.ametsoc.org/doi/pdf/10.1175/MWR-D-14-00339.1

ADDITIONAL ARTICLES

NMFS Publications

Managing whale-watching as a non-lethal consumptive activity
Journal of Sustainable Tourism (1.959)
J. Higham, L. Bejder, S. Allen, **P. Corkeron (NMFS/NEFSC**), and D. Lusseau

- Whale-watching is a form of commercial tourism that, has historically been accepted as a non-consumptive activity
- This paper pulls together 20+years of evidence to argue that in the effects of whale-watching on target cetaceans can be more substantial that is currently accepted.
- Based on this, we argue that there's a need for a paradigm shift in the regulation and management of commercial whale-watching.

Marine tourism is a relatively new frontier of late-capitalist transformation that now generates more global revenue than aquaculture and fisheries combined. This transformation has created whale-watching; a form of commercial tourism that, despite recent critique, has historically been accepted as a non-consumptive activity. Here, we draw together four existing academic discourses to critique global whale-watching as a form of capitalist exploitation; (1) commercial whale-watching and global capitalist transformation, (2) global capitalist politics and the perpetuation of whale-watching as non-consumptive, (3) the inherent contradictions of non-consumptive capitalist exploitation, and (4) whale-watching as a common-pool resource (CPR). These discourses lead us to critique current whale-watching practices in relation to the common capitalist sequence of resource diversification, exploitation, depletion and collapse. Drawing insights from specific impact studies, we conclude that a sustainability paradigm shift is required, whereby whale-watching (and other forms of wildlife tourism) is recognized as a form of non-lethal consumptive exploitation, and understood in terms of sub-lethal anthropogenic stress and energetic impacts. Finally, we argue the need for a paradigm shift in the regulation and management of commercial whale-watching, and present the case for a unified and international framework for managing the negative externalities of whale-watching.

Acceptance date: 9 June 2015

Geographical and temporal dynamics of a global radiation and diversification in the killer whale

Molecular Ecology (5.84)

P. A. Morin (NMFS/SWFSC), K. Parsons (NMFS/AFSC) F. Archer, (NMFS/SWFSC), M. Ávila-Arcos, L. Barrett-Lennard, L. Dalla Rosa, S. Duchêne, **J. Durban (NMFS/SWFSC),** G. Ellis, S. Ferguson, J. Ford, **M. Ford (NMFS/SNFSC),** C. Garilao, T. Gilbert, K. Kaschner, C. Matkin, S. Petersen, **K. Robertson (NMFS/SWFSC),** I.Visser, **P. Wade (NMFS/AFSC),** S. Ho, and A. Foote

- Better understanding of the timing of diversification leading to potential subspecies or species
- Inference of patterns and processes driving diversification of a globally distributed, highly mobile top predator
- Strong mitochondrial DNA and nuclear DNA support for genetic isolation of sympatric ecotypes (e.g., residents and transients in the North Pacific)

Global climate change during the Late Pleistocene periodically encroached and then released habitat during the glacial cycles, causing range expansions and contractions in some species. These dynamics have played a major role in geographic radiations, diversification and speciation. We investigate these dynamics in the most widely distributed of marine mammals, the killer whale (*Orcinus orca*), using a global dataset of over 450 samples. This marine top predator inhabits coastal and pelagic ecosystems ranging from the ice edge to the tropics, often exhibiting ecological, behavioral and morphological variation suggestive of local adaptation accompanied by reproductive isolation. Results suggest a rapid global radiation occurred over the last 350,000 years. Based on habitat models, we estimated there was only a 15% global contraction of core suitable habitat during the Last Glacial Maximum, and the resources appeared to sustain a constant global effective female population size throughout the Late Pleistocene. Reconstruction of the ancestral phylogeography highlighted the high mobility of this species, identifying 22 strongly supported long-range dispersal events including inter-oceanic and inter-hemispheric movement. Despite this propensity for geographic dispersal, the increased sampling of this study uncovered very few potential examples of ancestral dispersal among ecotypes. Concordance of nuclear and mitochondrial data further confirm genetic cohesiveness, with little or no current gene flow among sympatric ecotypes. Taken as a whole, our data suggest that the glacial cycles influenced local populations in different ways, with no clear global pattern, but with secondary contact among lineages following long-range dispersal as a potential mechanism driving ecological diversification

Expected Publication date**:** June/July 2015

Available online: http://onlinelibrary.wiley.com/doi/10.1111/mec.13284/abstr

Mixed assemblages of drilling predators and the problem of identity in the fossil record: a case study using the muricid gastropod Ecphora

Paleobiology (2.658)

M. M. Casey, Ú. C. Farrell, G. P. Dietl, **D. J. Veilleux (NMFS/NEFSC)**

- Drill-holes made by gastropods are frequently used in evolutionary and ecological studies because they provide direct, preservable evidence of predation.
- Using an extant drilling snail, the authors showed that extinct murexes of the genus *Ecphora* could be a plausible source of predation on fossil bivalves.

Drill-holes made by muricid and naticid gastropods are frequently used in evolutionary and ecological studies because they provide direct, preservable

evidence of predation. The muricid *Ecphora* is common in many Oligocene to Pliocene Atlantic Coastal Plain assemblages in the United States, but is frequently ignored in studies of predation by naticid (moon) snails. The authors used a combination of Pliocene fossil, modern beach, and experimentally derived samples to evaluate the hypothesis that *Ecphora* was an important source of drill-holes in infaunal bivalve prey shared with naticids. We focused on the large, thick-shelled venerid, *Mercenaria*, which is commonly drilled by naticids today. Naticids preferentially drill near the umbo, show a significant correlation between prey size and predator size, and prefer small *Mercenaria* (<60 mm dorsal-ventral length) when other prey are present. Fossil samples containing *Ecphora* (with or without other large muricids) show no drill-hole site clumping, greater variability in hole placement, no significant prey to predator size correlation, drilled prey shells larger than the largest modern naticids could produce in an experimental setting, and drill-holes larger in diameter than those estimated for the largest Pliocene naticids, thus supporting their hypothesis. Substantial overlap in the placement of holes drilled by naticids and muricids, however, made identifying predators from drill-hole position problematic. Whereas the difficulty in determining predator identity from drill-holes limits the types of analyses that can be reliably performed in mixed predator assemblages, recognizing *Ecphora* as a prominent drilling predator creates the opportunity to investigate previously unrecognized questions.
Expected Publication date**:** June 2015

Incorporating climate change projections into riparian restoration planning and design

Ecohydrology (2.426)

L. Perry, L. Reynolds, **T. J. Beechie (NMFS/NWFSC)**, M. Collins, and P. B. Shafroth

- This review focuses on how climate change can be incorporated into restoration planning
- Climate projections inform riparian restoration planning at the key stages of defining project goals and design criteria, and evaluating design alternatives.
- Climate change scenarios can inform site and species selection for riparian restoration.

Climate change and associated changes in streamflow may alter riparian habitats substantially in coming decades. Riparian restoration provides opportunities to respond proactively to projected climate change effects, increase riparian ecosystem resilience to climate change, and simultaneously address effects of both

climate change and other human disturbances. However, climate change may alter which restoration methods are most effective and which restoration goals can be achieved. Incorporating climate change into riparian restoration planning and design is critical to long-term restoration of desired community composition and ecosystem services. In this review, scientists discuss and provide examples of how climate change might be incorporated into restoration planning at the key stages of assessing the project context, establishing restoration goals and design criteria, evaluating design alternatives, and monitoring restoration outcomes. Restoration planners have access to numerous tools to predict future climate, streamflow, and riparian ecology at restoration sites. Planners can use those predictions to assess which species or ecosystem services will be most vulnerable under future conditions, and which sites will be most suitable for restoration. To accommodate future climate and streamflow change, planners may need to adjust methods for planting, invasive species control, channel and floodplain reconstruction, and water management. Given the considerable uncertainty in future climate and streamflow projections, riparian ecological responses, and effects on restoration outcomes, planners will need to consider multiple potential future scenarios, implement a variety of restoration methods, design projects with flexibility to adjust to future conditions, and plan to respond adaptively to unexpected change.

Acceptance date: 3 May 2015

A comparison of surface chlorophyll, primary production, and satellite imagery in hydrographically different sounds off southern New England

Marine Ecology Progress Series (2.64)

L. Fields, J. Mercer, **K. Hyde (NMFS/NEFSC)**, M. Brush, S. Nixon, C. Oviatt, M. Schwartz, D. Ullman, and D. Codiga

- First annual time series measurements of primary production in Block Island and Rhode Island Sounds
- Differences in primary production and chlorophyll concentration between the Sounds are linked to differences in water column stratification and physical processes of the two Sounds.

Block Island Sound (BIS) and Rhode Island Sound (RIS) are adjacent, inner continental shelf ecosystems with contrasting hydrographic regimes. BIS exhibits more energetic tidal mixing, and water column stratification that remains weak but persists year-round due to nearby estuarine exchange flow. RIS is less influenced by estuaries and more seasonal with strong stratification in summer. Researchers compared annual cycles of phytoplankton biomass and primary production in BIS

and RIS using measurements (surface chlorophyll, ^{14}C primary production), primary production models (Webb/Platt and BZE models), and satellite ocean color products. During 22 months of sampling, measured surface chlorophyll was not significantly different between BIS (mean=1.86 mg m^{-3}) and RIS (mean=1.69 mg m^{-3}), and bimodal peaks of phytoplankton biomass and production occurred concurrently in both Sounds. In contrast, a twelve-year ocean-color based chlorophyll time series indicated higher long-term average surface chlorophyll in the more well-mixed system (BIS mean=1.50 mg m^{-3}; RIS mean=0.86 mg m^{-3}). BIS annual primary production (318-329 g C m^{-2} y^{-1}) was higher than RIS (239-256 g C m^{-2} y^{-1}; $p<0.001$). These differences were most apparent during the summer, concurrent with the largest differences in water column stratification. Phytoplankton bloom phenology was driven by physical processes, with chlorophyll significantly related to water column stratification ($r=-0.51$, $p=0.01$), depth of the euphotic zone ($r=-0.54$, $p=0.05$), and surface water salinity ($r=0.54$, $p=0.04$). Primary production was correlated with surface water temperature ($r=0.57$, $p=0.03$) but the mechanisms underlying production differences between the Sounds remain unresolved. Researchers hypothesize that different hydrographies give rise to different productivity between the Sounds.

Acceptance date: 8 June 2015

Benthic ecology of northern quahog beds with different hydraulic dredging histories in Long Island Sound

Journal of Coastal Research (0.980)

R. Mercaldo-Allen, R. Goldberg, P. Clark, C. Kuropat, S. Meseck, and **J. Rose (NMFS/NEFSC)**

- This study provides insight into effects of hydraulic harvesting on clam beds with different dredging histories that may be useful in explaining and understanding patterns of benthic community structure in Long Island Sound.

We studied benthic community composition of 4 shellfish beds in Long Island Sound near Milford, Connecticut, where northern quahog or hard clams, *Mercenaria mercenaria* (Linnaeus 1758) were harvested by hydraulic dredge. These leased beds reflect a variety of dredging histories; 0-year (dredged just before sampling began), 1-year post-harvest, 2-years post-harvest, and an inactive clam bed left fallow for at least 10 years. Benthic sediment was sampled at one to two week intervals from June to October 2011 using a Smith-McIntyre grab. Benthic community composition was significantly influenced by dredging history

and sampling month. Abundance of benthic organisms (number of individuals and biovolume) and total organic matter concentrations were significantly greater at the 0-year site than at the 1, 2 and 10+ year sites, and significantly greater at the 1 and 2 year sites than at the 10+ site. Newly settled bivalves, primarily *Nucela* spp. and *Yoldia limulata*, were significantly more prevalent on the recently harvested 0, 1 and 2-year sites versus the 10+ year site and highest at the 0-year site. A significantly greater number of species were observed on the 1 and 2-year sites versus the 0 and 10+ year locations. Species richness at the 0-year site was significantly lower than at the 1, 2 and 10+ year sites while diversity and evenness at the 0-year site was significantly lower than at the 10+ year site. Our study observed successional changes in community structure of inshore clam beds related to the length of time elapsed following harvest dredging.
Acceptance date: 20 June 2015

Productivity change in commercial fisheries: An introduction to the special issue
Marine Policy (2.621)
J. Walden (NOAA NEFSC), **B. Fissel (NOAA AFSC)**, **D. Squires (NOAA SWFSC)**, N. Vestergaard

- This article provides an overview of productivity as an economic performance metric, and highlights specific studies of productivity change in commercial fisheries during the past 50 years.
- Productivity is a key economic indicator of the relationship between input quantities and the amount of output produced.

Productivity is a key economic indicator that measures the relationship between inputs used to produce a product, and the amount of product produced. Productivity change measures how productivity has changed through time. In traditional land based industries, these two economic metrics have been extensively measured and studied. Until recently, this has not been true for commercial fishing fleets. This article provides an overview of productivity as an economic performance metric, and highlights specific studies of productivity change in commercial fisheries during the past 50 years. It concludes with an introduction to the articles contained in this special edition.
Acceptance date: 19 June 2015

<u>OAR Publications</u>

Facilitating the use of drought early warning information through interactions with agricultural stakeholders

BAMS (11.57)

J. Otkin (NESDIS/OSGS), M. Shafer, **M. Svoboda(NWS/ER/WFO)**, B. Wardlow, M. Anderson, **C. Hain (NESDIS/STAR)**, and J. Basara

- Research funded by the Climate Program Office's Sectoral Applications Research Program focuses on the results of focus groups that were head with stakeholders in two NIDIS pilot regions.

Rapid onset drought events or "flash droughts" occur rapidly (i.e., as short as a few weeks) and can impact agriculture harsher than longer lasting droughts because farmers have less time to prepare them. Drought early warning during these rapidly evolving situations, however, is difficult to obtain using existing drought forecasting products. Early warning signals can be identified through drought indicators such as the Evaporative Stress Index. This short note describes results from two focus group meetings that were held to present the ESI and associated datasets. This BAMS note describes the results of focus groups that were held with stakeholders in two NIDIS pilot regions, to better understand how they could use drought early warning information to prepare for flash drought development. This work was funded by CPO's SARP program.

Expected Publication date: July 2015

Temporal trends in nutritional state and reproduction of quagga mussels in southern Lake Michigan

Journal of Great Lakes Research (1.77)

P. W. Glyshaw, C. M. Riseng, T. F. Nalepa, and **S. A. Pothoven (OAR/GLERL)**

- Results indicate that quagga mussel populations in SE Lake Michigan are stabilizing at shallow (25 m) and intermediate (45 m) depths, but continue to grow at deeper depths (93 m).

Currently little is known about the nutritional state and spawning patterns of quagga mussels (*Dreissena rostriformis bugensis*) in deeper, consistently cold regions of the Great Lakes. This lack of information limits predictions of the future expansion of mussels in the offshore regions of the Great Lakes. The authors collected quagga mussels on a monthly basis in 2013 (April-September) at three established sites along a depth transect (25-, 45-, and 93-m) in southern Lake Michigan and calculated a Condition Index (CI; ratio of dry soft tissue weight to internal shell capacity) to assess nutritional state, and a gametogenic index to assess reproductive activity. They also measured size frequency, density, and biomass in March, July, and August. Nutritional state was consistently highest at 25-m, population biomass and average shell length were highest at 45-m, and

density was highest at 93 m. At all three depths, CI decreased with increasing shell length suggesting that food availability may be limiting for larger individuals. Mussels at 45-m spawned earliest with over 50% spent by July, while mussels at 93-m began spawning in August. Mussels at 25-m had not yet spawned by September. Long-term trends in density indicate that quagga mussel populations continue to expand in deep water, but may be stabilizing shallower.
Expected Publication date: August 2015

A modeling study of the effects of river runoff, tides, and surface wind-wave mixing on the eastern and western Hainan upwelling systems of the South China Sea, China

Ocean Dynamics (1.68)

D. Wang, Y. Yang, **J. Wang**, K. Mizobata, and **X. Bai (OAR/GLERL)**

- Investigation of the variation of upwelling on the east coast of the island of Hainan (located in the South China Sea) during the East Asia summer monsoon season.
- Using an FVCOM model, the authors found that upwelling was suppressed by river runoff, promoted by tidal mixing, and inhibited by surface wind-wave mixing.

This study investigates the variation of eastern Hainan (or Qiongdong) and western upwelling systems during the East Asia summer monsoon (EASM) season using a state-of-the-art finite volume coastal model. The results revealed the impacts of tidal mixing, surface wind-wave mixing, and river runoff on the Hainan upwelling in terms of the spatial and temporal variations, intensification, and vertical structure. The authors found that 1) river runoff, a stabilizer of the water column, suppresses the upwelling beneath it from reaching the surface, although strong upwelling still occurs in the lower layer of the water column; 2) tidal mixing, a mechanism of forming bottom mixed-layer depth, promotes upwelling, leading to strengthening of the upwelling; 3) surface wind-wave mixing, a major mechanism for formation of the upper mixed layer and a large-gradient thermocline, inhibits the upwelling from crossing the thermocline to reach the surface; and 4) unlike upwelling on the east coast, the upwelling on the west coast is tidally induced.
Expected Publication date: June 2015

Present and future Laurentian Great Lakes hydroclimate conditions as simulated by regional climate models with an emphasis on Lake Michigan-Huron

Climatic Change (3.430)

B. Music, A. Frigon, **B. M. Lofgren (OAR/GLERL)**, R. Turcotte, J. F. Cyr

- This paper compares simulations of the Great Lakes regional climate under future scenarios based on multiple existing model runs, most of which do not include direct two-way interaction between the Great Lakes and the atmosphere
- Analysis suggests an amplification of the Net Basin Supply (NBS) annual cycle and an intensification of the annual NBS minima in future climate.
- Adaptive management of water will be needed to minimize negative implications associated with more severe and frequent NBS minima.

Regional climate modelling represents an appealing approach to projecting Great Lakes water supplies under a changing climate. In this study, we investigate the response of the Great Lakes Basin to increasing greenhouse gas and aerosols emissions using an ensemble of sixteen climate change simulations generated by three different Regional Climate Models (RCMs): CRCM4, HadRM3 and WRFG. Annual and monthly means of simulated hydrometeorological variables that affect Great Lakes levels are first compared to observation-based estimates. The climate change signal is then assessed by computing differences between simulated future (2041–2070) and present (1971–1999) climates. Finally, an analysis of the annual minima and maxima of the Net Basin Supply (NBS), derived from the simulated NBS components, is conducted using Generalized Extreme Value distribution. Results reveal notable model differences in simulated water budget components throughout the year, especially for the lake evaporation component. These differences are reflected in the resulting NBS. Although uncertainties in observation-based estimates are quite large, our analysis indicates that all three RCMs tend to underestimate NBS in late summer and fall, which is related to biases in simulated runoff, lake evaporation, and over-lake precipitation. The climate change signal derived from the total ensemble mean indicates no change in future mean annual NBS. However, our analysis suggests an amplification of the NBS annual cycle and an intensification of the annual NBS minima in future climate. This emphasizes the need for an adaptive management of water to minimize potential negative implications associated with more severe and frequent NBS minima.

Expected Publication date: 11 June 2015

<u>Joint Line Office Publications</u>

Data management strategy to improve global use of ocean acidification data and information

Oceanography (2.986)

H. E. Garcia (NOAA/NCEI), C. Cosca (OAR/PMEL), A. Kozyr (NOAA/NCEI), E. Mayorga, C. Chandler, R.W. Thomas, K. O'Brien (NOAA Cooperative Institute-JISAO), W. Appeltans, **S. Hankin (OAR/PMEL)**, J. A. Newton, **A. Gutierrez (NWS**), J. P. Gattuso, L. Hansson, **M. Zweng (NOAA/NCEI),** and B. Pfeil

- It is critically important that researchers around the world are easily able to find and use reliable ocean acidification (OA) information.
- To this end, there must be a worldwide strategy for collecting and managing the many types of OA data, which include observing data (e.g. time-series moorings, process studies, research cruises), biological response experiments (e.g., mesocosm), data products, and model output.

Ocean acidification (OA) refers to the general decrease in pH of the global ocean as a result of absorbing anthropogenic CO2 emitted in the atmosphere since preindustrial times (Sabine et al., 2004). There is, however, considerable variability in ocean acidification, and many careful measurements need to be made and compared in order to obtain scientifically valid information for the assessment of patterns, trends, and impacts over a range of spatial and temporal scales, and to understand the processes involved. A single country or institution cannot undertake measurements of worldwide coastal and open ocean OA changes; therefore, international cooperation is needed to achieve that goal. The OA data that have been, and are being, collected represent a significant public investment. To this end, it is critically important that researchers (and others) around the world are easily able to find and use reliable OA information that range from observing data (from time-series moorings, process studies, and research cruises), to biological response experiments (e.g., mesocosm), data products, and model output.

Expected Publication date: June 2015

OTHER REPORTS, BOOK CHAPTERS, AND INTERNAL PUBLICATIONS

NWS

Who does what – the roles of scientists in wildland fire weather

Fire Management Today

R. Heffernan (NWS)

- The benefits and uses of weather information for wildland fire purposes continue to grow, as do the opportunities for scientists to make a difference in fire weather.

- Continuing to merge fire weather efforts with the fast track to advancing science and transitioning advancements to operations.

The role of meteorology for wildland fire is quite diverse and requires an interagency team of highly qualified scientists to fill the needs of the fire community. Fire weather roles, such as operational forecasting, research advancement, standards development, training and education, and coordination, occur among several federal agencies and the research community. Fire weather prediction is core to several programs within the federal land management agencies. The NWS has the lead role with regard to operational fire weather forecasting and providing air quality modeling. In addition, the five federal land management agencies have jointly funded fire weather support within the Predictive Services program hosted by the Geographic Area Coordination Centers (GACCs) and the National Interagency Coordination Center (NICC). The U.S. Department of Agriculture supports fire weather and air quality research through the Forest Service meteorology research program. The Wildland Fire Management Research Development and Application (WFM RD&A) unit is an interagency group that links fire management, research, and weather products. In addition to the operational and research programs, these entities work together through the National Wildfire Coordination Group (NWCG) to provide national leadership in measuring and predicting the wildland fire environment.

Expected Publication date: October 2015

Red flag warnings in the 21st century

Fire Management Today

H. Hockenberry (NWS/AFSO)

- Advances in remote-sensing, on-the-ground intelligence and radar sensing may lead to new ways of issuing the red flag product.
- This includes possibly changing the RFW process to associate the warnings with actual fire detection. In such a future scenario, as the fire is detected or a reported, the WFO would examine the meteorological conditions and issue warnings based on the detected fire behavior and potential threat.

A Red Flag Warning (RFW) is the fundamental fire weather warning product of the National Weather Service (NWS). The RFW became particularly important after the devastating California fires of 1970. Today, the NWS Fire Weather Services Product Specification Directive states forecasters issue a RFW, "when the combination of fuels and weather conditions support extreme fire danger and/or fire behavior." Determination of RFW criteria is accomplished through a) meetings

between local NWS Weather Forecast Offices (WFOs) and local users; and b) historical analysis of fire danger and fire behavior within what is known as a fire weather zone. The core, general parameters used to determine a RFW includes critical values of wind, relative humidity, lightning potential, and fuels data.
Expected Publication date: Fall 2015